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Chinese Competition and Skill-Upgrading in European Textiles: Firm-level Evidence

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Abstract

In this paper we study the effect of import competition from China on the Belgian textiles sector. Our analysis comprises both trade data and firm-level data. We study the evolution of the unit values in textiles exported from China into the EU versus textiles exported from Belgium to the rest of the EU over the past ten years. We clearly find evidence of a widening price gap between Chinese and Belgian textiles export prices. Chinese textiles seem to become relatively cheaper over time. These findings are in line with Schott (2004; 2007) who argues that capital abundant countries in the US and Europe use their endowment advantage to produce product varieties that are superior in quality compared to labour intensive countries like China. Next we use firm-level data on Belgian textiles firms in search of evidence of quality and skill upgrading in Belgian textiles exports. We study the evolution of firm-level variables such as R&D outlays, the proportion of skilled and unskilled labour and capital intensity used in production. Both China's entry into the WTO and the end of the Multi-Fibre Agreement significantly seem to cause important shifts in firm level production processes. Mainly China's entry into the WTO in 2001 triggered disinvestment resulting in a reduction in size of the Belgian textiles' sector. But at the same time the textiles sector seems to be responding to the competition from a low-wage country like China by increasing the skill-content of its products. After 2001, we find a significant increase in R&D spending, training activity, skill upgrading and higher capital intensity in production. This evidence is in line with theoretical predictions based on a re-interpretation of neo-classical trade theory that for developed countries, the opening of new markets will result in an increase in the factor content in their traditional sectors.

[1] We would like to thank participants of the CEBF conference in Louvain-la-Neuve on November 21, 2007 for useful comments.

1. **Introduction**

The last two decades have witnessed an impressive move towards more liberalised trade regimes, resulting from progress both in the multilateral trading system and the flourishing of regional or bilateral trade agreements. The opening of domestic economies has generally been accompanied by a surge in international competition. This is also true for some sectors in Europe and particularly in a small open economy like Belgium where a number of manufacturing activities are subject to increased competition from emerging economies. China is amongst the most prominent emerging countries to the extent that China has become the first source of imports for the EU15 in 2006[2]. Among the EU sectors where the surge in global competition has been most spectacular is textiles and clothing

Indeed, besides the general trend towards increased trade liberalisation, the textile and clothing sector has also been characterised important changes in its trade related institutional surrounding. Since 1995, most trade in textile is governed by the WTO Agreement on Textile and Clothing (ATC) which, in application of the general principle of GATT, foresaw the progressive elimination of quotas set in the US, Canada and the EU under the Multi-fibre Arrangements. In accordance with the ATC, the last textile quotas was dismantled on January 1 2005, allowing WTO members (of which China since 2001) unrestricted access to European, American and Canadian markets. However, in the case of Europe, a political agreement was signed with China in June 2005 for limiting some categories of Chinese textile and clothing exports to the EU. Accordingly, quantitative restrictions were reintroduced on the ten most sensitive categories of products for a limited period of time running until January 1 2008. It nevertheless remains true that, although mitigated, the competitive pressure on EU textile and clothing producers has dramatically increased in recent years.

In the face of such developments, classic trade theory predicts that the EU textile and clothing sector should reduce, if not completely vanish, in the EU portfolio of industrial activities. This is to some extent true for the EU where the volume of production has decreased by around 20% between 2000 and 2006. Things seem more complex for Belgium. About 80% of the volume of domestic textiles production is exported, 85% of exports being sold on EU market. According to the Belgian Textiles Federation (FEBELTEX) employment in the sector continues to decrease while at the same time, firms report having

[2] According to the EC, in 2006 China accounted for 14.2% of EU imports against 13.1% for the US.

difficulties in finding skilled workers for achieving an increasing number of technical and/or critical tasks.

This reaction to a changing environment is in line with global trends observed in industrialised countries. In particular, several analysis of the competitive position of EU industries on world markets note the following observations[3]: (i) European exporters face less competition from US and Japanese products but more from Chinese and other developing countries' goods; (ii) EU firms tend to reinforce their position on the upper segments of each sector; and (iii) EU firms managed to increase their market shares in high technology goods only in upper segments of the markets. Identically, analysing the relative sophistication of Chinese exports to the US, Schott (2004) finds a significant overlap between Chinese and OECD's exports with evidence based on trade data that is indicative of quality upgrading in high income countries. Other papers like Bernard et al. (2006) have also found evidence of a relatively more product-switching going on by those firms subject to strong import competition.

The object of this paper is twofold. To test the hypothesis that Belgian firms in the textile industry are turning to products with a higher skill content and higher value added and that this move is significantly triggered by the increased competitive pressure from low-wage countries, in particular from China. We intend to conduct this analysis following the methodology of Schott (2004, 2007) who uses export unit values as a proxy for price which in turn is a measure of relative sophistication of products. However, the evolution of unit values is not sufficient evidence of quality upgrading. Alternative explanations can be thought of for the relative decline in the price of Chinese textiles imports such as the low value of the Chinese currency, the Yuan in recent years. Arguably the best way to go about is to turn to firm-level data in search of evidence of a change in the factor content of textile firms. We turn to Belgian data since Belgium is one of the few countries where firms have to publish detailed information on the skill level of workers that are employed. In addition to the skill labour mix we also look at the evolution of capital, labour and R&D outlays at the firm level to see whether competition from China has resulted in a shift in some of these variables.
Our findings can be summarized as follows. Similar to Schott (2004, 2007) for the US we find evidence of a widening price gap between Belgian and Chinese textiles. Turning to firm-level data we find a causal link between Chinese presence in global markets and the increase in

[3] See for instance Cheptea A., Gaulier G., Sondjo D. and S. Zignago (2006)

R&D, the skill mix and capital intensity in Belgian textile firms. We interpret our results as evidence in support of the hypothesis that global competition has resulted in quality upgrading in the textile industry. Our findings suggest that Belgian textiles one the one hand has downsized a lot in the face of Chinese import competition and operates now at a much smaller scale than it used to but has moved into products with a higher physical and human capital intensive factor content.

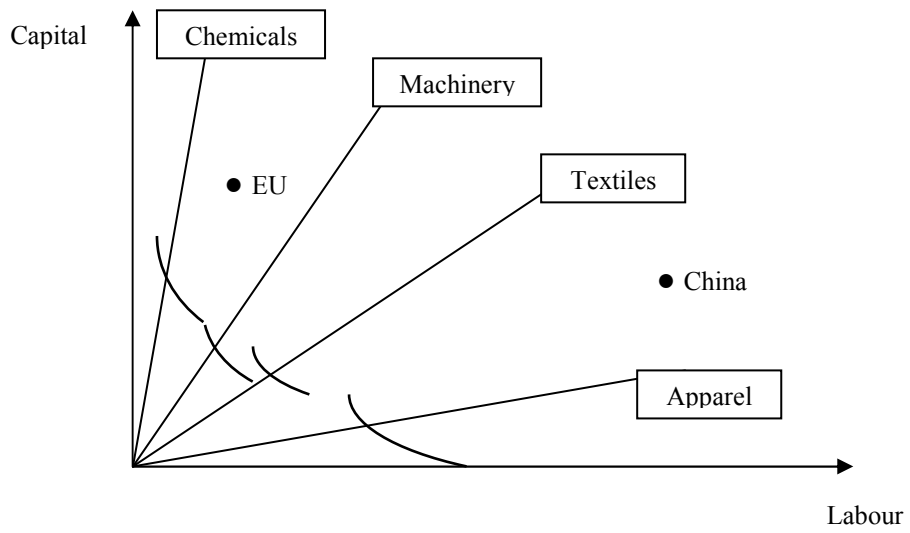
The paper is structured as follows. Section 2 recalls the main conclusions of neoclassical trade theory in view of clarifying the nature of the empirical exercise carried out in the rest of the paper. The third section describes the various data used in the analysis and identifies the main limitations and measurement challenges. Section four displays the results of the estimations while section 5 concludes.

2. The theory of comparative advantages revisited

One of the most influential models of classical trade theory is the one developed by Ohlin (1933) which relates comparative advantages of trading countries to relative factor endowments. The model is not only helpful to reassess the manner in which comparative advantages drive countries' specialisation in given activities and the resulting trade pattern that arises from it, but also to understand the income distributional implications of international trade. Ohlin model demonstrates that as the abundant factor gains from trade, the scarce one loses which in general is referred to as the Stolpler-Samuelson theorem.

In a simplified version, two factors of production (capital and labour) are used by a set of countries to produce different goods (says textiles, chemicals, apparel and machinery). The basic principle is synthesised by the Lerner (1952) diagram (Fig. 1), which displays dollar-value isoquants for the four industries. Each isoquant represents the amounts of capital and labour that can be combined to produce one dollar's worth of output in the noted industry. As indicated by the shape of the respective isoquants, industries differ in terms of their factor intensity. In our example, apparel is the most labour-intensive industry while chemicals is the most capital intensive, i.e. in order to produce 1 dollar's worth of chemicals, the best combination of capital and labour will feature a higher capital to labour ratio than in the apparel industry.

Figure 1: Cone of diversification



The industries' unit-value isoquants define the "diversification cones", i.e., sets of factor endowments determining the production pattern of countries in the case of trade. Inside a cone, profit maximisation will lead countries to be prominently active in the industries whose input intensities are most closely related to their endowments. Outside the cones, a country will completely specialise in the industry whose ray is the closest to the point representing its factor endowment. In our example, the EU is "located" in the most capital-abundant cone, while China is in the most labour-abundant cone. Accordingly, in case of trade between these two countries, the diagram indicates that the EU will produce relatively more chemicals and machinery while China will concentrate on textiles and apparel. Consequently, one can expect that the deepening of trade between China and the EU will have (at least) two major consequences: (i) China will outweigh the EU in industries whose factor intensity is closely related to its factor endowment (and therefore far from the one of the EU) and (ii) the EU will outweigh China in industries whose factor intensity is closely related to its factor endowment (and therefore far from the one of China). Given that the textile industry is supposed to be labour intensive and that the EU is supposed to be relatively more capital abundant than China, the model predicts that competition with China should lead the EU to reduce or even abandon its activities in labour intensive sectors such as textiles. As a corollary, the model also predicts that the EU and China should have few industries in common and that

accordingly they should trade goods belonging to different industrial groups (e.g. chemicals against textiles). This type of trade is referred as "inter-industry" trade[4].

However, this prediction is hard to reconcile with (apparently) empirical observations. The bulk of international trade seems to takes place within industries and it is of the "intra-industry" type, i.e. trading cars against cars or mobile phones against mobile phones. Although intra-industry trade mostly involves developed countries, it is also observed in trade relationships between developed and developing countries. The "New" trade theory tries to explain this phenomenon by assuming consumer's love for variety and by introducing horizontal product differentiation and increasing return to scale into theory models. This has provided a convincing explanation of intra-industry trade (see, for example, Krugman 1980 and Helpman&Krugman 1985). In such a setting, countries would indeed produce and exchange different varieties of the same type of good that would be considered as different by consumers but that would not be different from the point of view of their technological content. Such trade with a large country like China would imply to witness an increase in the Chinese varieties available on EU markets and an increase in the European varieties available on Chinese markets. Even with an increase of global competition, the "new" trade theory does not necessarily predict a dramatic decline of the EU textile industry. However, even if traded within particular industries, evidence suggests that in a number of cases, difference between Chinese and European varieties is more than the one stemming from the consumers' perception of individual products and their "love for variety".

This issue is tackled by a third class of models relying on the concept of vertical differentiation, which emphasise difference in quality or sophistication between varieties within an industry. Interestingly, this approach allows for a reinterpretation of the comparative advantage theory, which closely matches observations of actual patterns of trade. Indeed, the implicit assumption behind the idea of vertical differentiation is that the factor or technological content of varieties differs: the production of the most sophisticated goods is relatively more intensive in capital, technology and high skilled labour. Isoquants in Figure 1 can therefore be used to represent vertically differentiated varieties in a single industry. Hence in Figure 1 both the EU and China could be active in textiles. But Europe would then specialize more in high value added textile products, while China would specialize in labour

[4] It is important to notice that countries specialization is driven by factor endowments and not by differences in technologies. All countries share the same production function, but costs differ depending on factor endowments.

intensive low value added type of textiles. Put differently, countries would engage in a relative specialisation towards the varieties that are more closely related to their relative factor endowments. In such case, the textile industry would not disappear from the European portfolio of activities but would rather restructure to concentrate on its segments including the products and varieties with a higher content in capital, R&D and skilled labour.

Tracking products' degree of sophistication is almost impossible. There is however a manner to turn the difficulty around. Indeed, comparing exports of OECD countries and China in similar industries on the US market, Schott (2007) shows that unit values of trade varieties is not only is a good proxy of their relative sophistication but is also closely related to their factor content. He also finds that the pattern of trade reflects the factor endowment of trading countries, thereby validating the hypothesis that a fraction of what appears like intra-industry trade is in fact driven by the neo-classical Heckscher-Ohlin type of mechanisms. When subject to international competition, countries endowed with relatively large amount of capital, technology and/or skilled labour are therefore expected to specialise in the production of more sophisticated varieties which in general feature higher unit values: more sophisticated goods are use more intensely these factors.

Using the methodology adopted by Schott, i.e. approximating quality by unit values, we intend to investigate if such "moving up the quality ladder" can be detected for the Belgian textile industry in reaction to the surge in competition with Chinese products on EU markets. Moreover, linking these results to firm level data, we will assess the extent to which possible specialisation in more sophisticated segments of the industry has been achieved by having more recourse to capital/R&D/skilled labour intensive technologies. For this purpose we will start by studying the patterns of unit values in the textiles sector to see whether we can find the same result as Schott (2007) i.e. a widening in the price gap of Belgian versus Chinese textiles. Next, we will identify Belgian Textile firms to study their investment in R&D, capital and employment as a function of the increase in Chinese imports.

3. Data and Some stylised facts

3.1. Data

Trade data are extracted from the Eurostat COMEXT database. We retrieve export data of China to the EU15 as well as Belgian textile exports to the countries of the EU15. This way we can consider the export prices for both countries in the same export destination market. The products that we consider in the textiles are identified by 4-digit NACE[5] sectors 1710, 1720, 1740, 1751, 1752, 1753, 1754, 1760, 17771, 1772, 1810, 1821, 1822, 1823, 1824, 1830, 1920, 1930 (a detailed data description is in the Appendix).

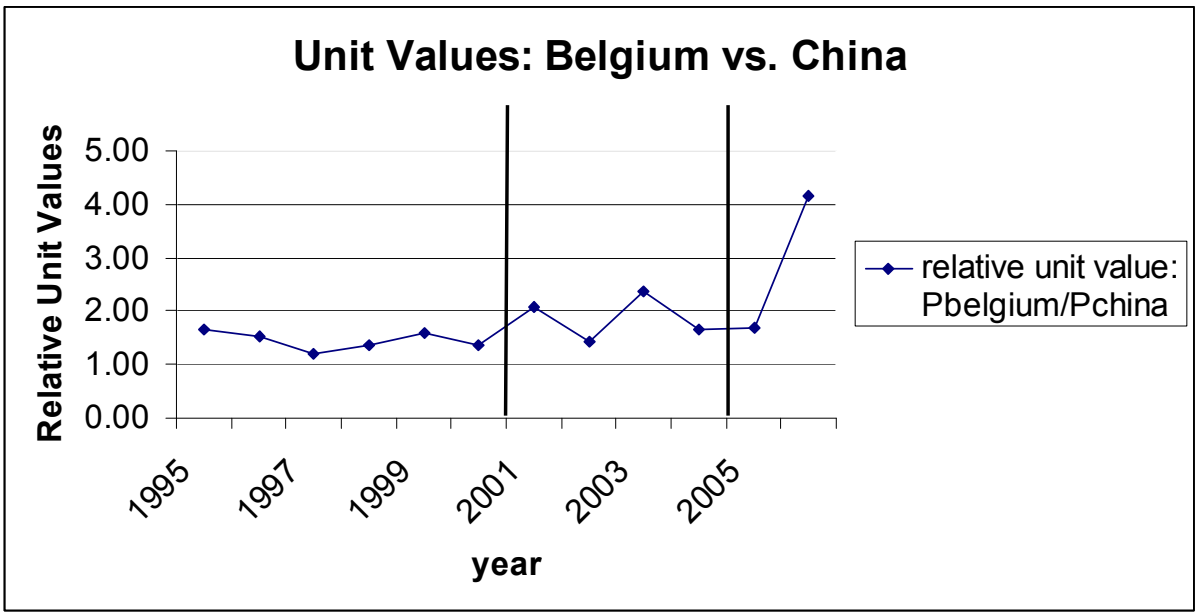
Firm level data are extracted from the BELFIRST database. This database contains very detailed firm-level information in company accounts format. We identify all Belgian Textile firms operating in the four-digit NACE sectors listed above. This way we obtain more information on the characteristics of the textiles firms' production process, in particular its intensity in the use of (i) labour vs. capital, (ii) low-skilled labour vs. high skilled-labour and (iii) in R&D and patents.

3.2 Evolution of export volumes, values and prices

We start by showing the evolution of Belgian and Chinese Textiles prices in the EU15 (Figure 2). As indicated above, the main indicator used to assess quality differentials between various countries of the same product group is the price. We use the Eurostat-COMEXT database on values and volumes of exports to compute the unit value of Belgian (P_b) and Chinese (P_c) textile exports to the EU-15 market[6] which can simply be done by dividing values by the quantities[7]. This further allows us to compute relative prices of Belgian versus Chinese textiles products in the same export market. Figure 2 displays the evolution of the relative prices (P_b/P_c) over the period 1995- 2006 where product groups were aggregated within the textile industry. The relative price in Figure 2 is an average of the unit values in the NACE sectors mentioned above. It is constructed as a weighted mean between each product group's price[8] included in a specific sector where the weights are the values' share of exports of each product inside its own NACE sector.

[5] Statistical Classification of Economic Activities in the European Community (NACE)
[6] We take the EU15 market since over the past 10 years the EU expanded several times but we want a consistent group of countries over a ten year period.
[7] In Eurostat the volume of trade for all products is expressed in 1000kgs.
[8] Products are defined by 8-digit CN classification and matched with a 4-digit NACE group.

Figure 2: Evolution of Belgian and Chinese Textiles prices in EU15

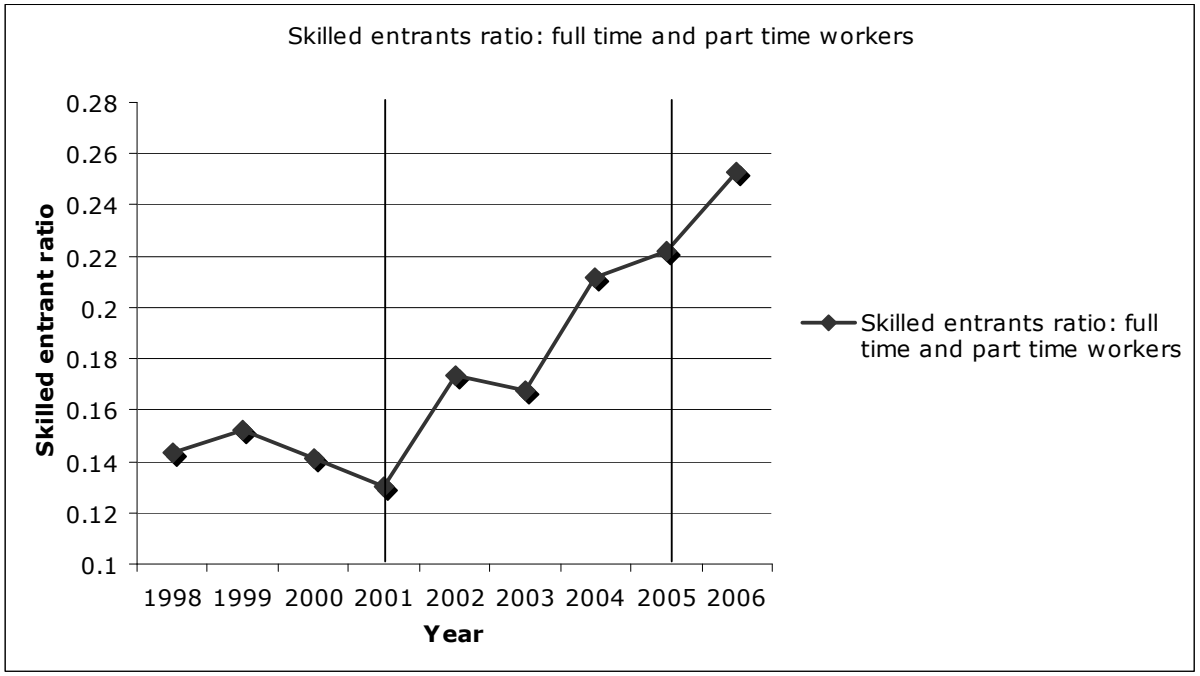


Source: Eurostat Trade Statistics.

The figure above clearly shows that over time the price gap between Belgian textiles and Chinese textiles has been increasing. The start of the increase seems to coincide with the entry of China into the WTO in 2001. We can see clearly that between the year 2000 and 2005 the relative unit value of Belgian textiles increased by 50%. Remarkable is the steep increase in the Belgian unit values since January 2005, which coincides with the end of the Multi-fibre Arrangement and the dismantling of the system of import quotas.

While the widening price gap with an increase in the Belgian price of textiles relative to the Chinese, is indicative of a move of the Belgian textile industry towards to segments with a higher factor content. Our purpose in the remainder of this paper is to analyze the extent to which this has been accompanied by a change in the characteristics of the production process of textile firms. A first indication of how firm-level variables moved can be seen from Figure 3 where we show that the skills content of workers has also substantially increased over the same period. We show that the skill content of both full-time and part-time workers seems to have gone up since 2001.

Figure 3: Evolution of Skill intensity in Belgian Textile Producers.



Source: BELFIRST. Aggregation of the skilled/unskilled workers ration of all Belgian Textile firms in NACE 4 digit sectors.

3.2. Firm- Level data

As mentioned above we obtain data at firm level from BELFIRST database, covering a period of nine year (1998-2006); our data consists of the population of Belgian Textile firms in the sectors mentioned above. More precisely we collect data on operating revenues, tangible fixed asset and labour employment to measure respectively output, capital and labour. We also construct a capital-labour ratio in order to assess capital intensity in firms' production process where divide machinery over the number of workers. To proxy firm effort in product upgrading we have data on R&D and on patents and we have flow data on skilled and unskilled workers.[9] Skilled workers are those with a higher degree education or University education. Unskilled workers are those workers with only primary or secondary education degree. Additionally our data also contains information on vocational training in terms of number of hours firms spent on training workers.

In addition we also have data on value added and raw material expenditures. This allows us to construct measures of productivity such as value added per worker (labour productivity) and

[9] We do not have stock data of skills present in the firm, but flow data i.e. skilled and unskilled entrants and quitters.

total factor productivity (TFP). We measure TFP with a parametric estimation of production function using the methodology by Levinshon-Petrin, where material costs are used as intermediate inputs.

4. Estimation Results

4.1 Firm-level analysis

Using a firm-level fixed effect method, we run several regressions where the dependent variable is one of the relevant firm characteristics (Employment, average wage, Skill-intensity, training, capital intensity, R&D, patents, productivity…) which we relate to the increased presence of China on global markets. We start by analyzing the effect of China's entry into the WTO. Our baseline equation is

$$Y_{it} = \alpha_i + \gamma CHINA_t + Year\_dummies + \varepsilon_{it}, \qquad (1)$$

where $CHINA_{it}$ is a dummy variable with a value of zero before China's entry in the WTO (2001) and 1 after that. We prefer the use of a dummy since the use of import volumes or values would be endogenous. The coefficients on this China dummy are reported in the third column of Table 1. The firm-level fixed effects α_i account for firm heterogeneity in the estimations and ε_{pt} is the *i.i.d.* error term; the dependent variables are in logs and observations are annual over a period of nine years (1998-2006). We also include a set of year dummies to account for business cycles. Results are shown in Table 1 below. Each row presents the results of a separate estimation. In the first column we indicate the dependent variable that was used in the estimation. Observations vary according to the specification that is estimated and the availability of data on a particular firm level characteristic (R&D, capital intensity, labor productivity…)[10].

From the results below it is clear that China's entry in the WTO coincided with a reduction in employment but an increase in the average wage. Furthermore we note from Table 1 a strong increase in the ratio of skilled over unskilled entrants[11] and an increase in both the amount of workers in on the job training ("Training") and the percentage of workers in training activities

[10] If we correct robust standard errors, clustering across industrial groups, results do not change.

[11] The ratio was defined as follows: $\frac{Entrants_{Skilled} / Quitters_{Skilled}}{Entrants_{Unskilled} / Quitters_{Unskilled}}$.

("Training/workers"). The increased hiring of more skilled workers is suggestive of the fact that firms are switching their product portfolio towards different types of products.

The production process also becomes more capital intensive; both the stock of "Machinery" and the capital intensity defined as "Machines/workers" goes up significantly.

If strong import competition results in quality upgrading of products we would expect EU firms to spend relatively more on R&D. Indeed in line with results on skill intensity and capital intensity we find R&D to rise substantially as well as the number of patents active in the sector. In terms of productivity we find both labour productivity and a more sophisticated productivity measure like "Total Factor Productivity" à la Levinsohn and Petrin as in specification 9 to go up significantly after China's entry into WTO.

Table 1: China's Entry in the WTO in 2001 and Quality Upgrading of Belgian Textiles in Levels

	Dependent Variable	**Constant**	**China in WTO**	**Obs.**	**R^2**	**F-test**
1	Employment	2.40*** (.011)	-.048*** (.013)	15774	.02	23.76
2	Av. Wage	3.16*** (.007)	.142*** (.009)	15765	.07	104.24
3	Skilled/Unskilled	1.16*** (.332)	2.62** (1.12)	1276	.02	2.00
4	Training	2.56*** (.665)	1.56** (.800)	23973	.001	3.15
5	Training/Workers	0.19*** (.002)	.022*** (.003)	15774	.01	14.27
6	Machinery	7.49*** (.049)	.214*** (.064)	3290	.02	4.89
7	R&D	4.70*** (.081)	.359*** (.099)	508	.13	4.13
8	Patents	3.80*** (.157)	1.19*** (.175)	1010	.24	18.02
9	TFP/Levinshon Petrin	2.03*** (.010)	.057*** (.014)	3150	.01	2.90
10	Machinery/Employees (Capital Intensity)	1.98*** (.199)	.142*** (.035)	3179	.03	5.09

Note: Confidence interval of 90 percent, ** Confidence interval of 95 percent, *** Confidence Intervals of 99 percent. Standard errors are robust. Year dummies are included in all specifications.

Next we adjust our baseline specification in (1) by instead of including a dummy on China's entry into the WTO by a dummy indicating the end of the Multi-Fibre Agreement. This Agreement had been put in place in 1995 and was mainly geared at protecting developed countries against the imports in textiles from developing countries. Once the Multi-Fibre

Agreement came to an end in 2005, countries like the EU and the US suddenly faced a huge increase in the amount of textiles mostly stemming from China, which introduced fierce competition. The EU's and the US response was to turn to temporary measures of protection in the course of 2005 to shelter those textile products where imports had surged most dramatically. In any case it is clear that after 2005 the competition in the EU textile market increased significantly.

The coefficients of interest on the "Multi-Fibre dummy" are listed in the third column of Table 2. Again each row represents a different regression. Firm-level fixed effects are included as well as year dummies in all regressions and dependent variables are in logs.

Results indicate that the textiles sector continued to shrink in terms of employment capital employment after 2005. In fact most of the variables seem to continue to move in the same direction as after China's initial entry into WTO.

Table 2: The End of the Multi-Fiber agreement in 2005 and Evidence of Quality Upgrading of Belgian Textiles in Levels.

	Dependent Variable	**Constant**	**Multi-Fibre Dummy**	**Obs.**	**R^2**	**F-test**
1	Employment	2.40*** (.011)	-.145*** (.015)	15774	.02	23.76
2	Av. Wage	3.15*** (.007)	.162*** (.011)	15765	.08	104.24
3	Skilled/Unskilled	1.15*** (.332)	.840 (.539)	1276	.02	2.00
4	Training	2.56*** (.665)	1.61** (.769)	23973	.01	3.15
5	Training/Workers	.019 (.003)	.021 (.004)	15774	.01	14.27
6	Machinery	7.48*** (.049)	.240*** (.059)	3290	.02	4.89
7	R&D	4.70*** (.081)	.675*** (.125)	508	.13	413
8	Patents	3.79*** (.156)	1.08*** (.172)	1010	.25	18.02
9	TFP/Levinshon Petrin	2.03*** (.010)	.056*** (.149)	3150	.01	2.90
10	Machinery/Employees (Capital Intensity)	1.98*** (.200)	.214*** (.053)	3179	.03	5.09

Note: Confidence interval of 90 percent, ** Confidence interval of 95 percent, *** Confidence Interval of 99 percent. Standard errors are robust. Year dummies are included in all specifications.

If we include both the "China_2001" dummy and the "Multi_Fibre dummy" in the estimations it appears that most of the significance of the "Multi_Fibre dummy" disappears. This can be verified from Table 3 below. The results in Table 3 suggest that in particular China's entry in 2001 had more of an impact on the performance of the Belgian textiles industry than the end of the Multi_Fibre agreement.

Table 3: EU Textiles response to China's Entry in WTO and the End of Multi_Fibre

	Dependent Variable	Constant	China in WTO	Multi-Fiber	Obs.	R^2	F-test
1	Employment	2.40*** (.011)	-.048*** (.013)	-.097*** (.012)	15774	.02	23.76
2	Av. Wage	3.16*** (.007)	.143*** (.009)	.019** (.009)	15765	.07	104.24
3	Skilled/Unskilled	1.16*** (.332)	2.62** (1.12)	-1.78 (1.23)	1276	.02	2.00
4	Training	2.56*** (.665)	1.56** (.800)	-1.01 (.614)	23973	.001	3.15
5	Training/Workers	0.19*** (.003)	.022*** (.003)	-.000 (.003)	15774	.01	14.27
6	Machinery	7.49*** (.049)	.225*** (.058)	.014 (.040)	3290	.02	4.89
7	R&D	4.70*** (.081)	.473*** (.147)	.202 (.123)	508	.13	4.13
8	Patents	3.80*** (.157)	.617*** (.170)	.469*** (.086)	1010	.25	18.02
9	TFP/Levinshon Petrin	2.04*** (.010)	.030** (.014)	.025* (.013)	3150	.01	2.90
10	Machinery/Employees (Capital Intensity)	1.98*** (.199)	.142*** (.035)	.071 (.053)	3179	.03	5.09

Note: Confidence interval of 90 percent, ** Confidence interval of 95 percent, *** Confidence Interval of 99 percent. Standard errors are robust. Year dummies are included in all specifications.

4.2 Sector analysis

Next we assess the hypothesis about the relative quality improvement of Belgian textiles in another way. We do this by relating the unit values from the Belgian versus Chinese exports in textiles to several EU15 countries to the volume of Chinese imports into the same EU15 countries. Or put differently we verify whether the increase of the relative Belgian price of textiles that we observe in the trade data as reported in section 3 is caused by the rise in the Chinese textiles exporting activity which we proxy by the "China_2001" dummy to control for the entry of China into the WTO which is the moment that seems to coincide with the rise

in Chinese exports. As in Schott (2007) we assume that prices proxy for goods quality. The export unit values of a specific product group *p* is obtained by dividing the values of Belgian exports by their quantity[12] (data by Eurostat, COMEXT). Hence, the dependent variable in the regressions that we report below is the ratio of Belgian unit values of exports over the corresponding Chinese ones where we relate exports in the same product and the same destination country[13],

$$\ln(UVR_{pt}) = \ln \frac{UV_{tp}^{Bel}}{UV_{tp}^{Ch}}, \qquad (2)$$

where $\ln(UVR_{pt})$ is the relative price for product *p* in year *t* exported to market m. The term $\ln(UVR_{pt})$ reflects the Belgian relative quality of exported product *p* to a country in the EU15 (Germany, France, Italy, Spain, Netherlands and United Kingdom) *vis a vis* Chinese products to the same destination market. Product groups *p* are defined by eighteen different four-digit NACE classifications as described in the Appendix. The time period we consider is the same one as for the firm-level analysis i.e. 1998-2006. Estimations include product level fixed effects. Country and year dummies are included in every specification.

The baseline equation that we estimate is the following

$$\ln(UVR_{pt}) = \alpha_p + \beta X_{pt} + \gamma CHINA_{2001} + \varepsilon_{pt}, \qquad (3)$$

where X_{pt} are sector *p* characteristics such as capital intensity, productivity and skill mix. The dummy $CHINA_{2001}$ evaluates China's entry in WTO. We also include sector specific fixed effects α_p. Standard errors are robust. We have annual observations over nine years (from 1998 to 2006) and over eighteen different product groups. Results are shown in Table 4 where each column shows a different estimation. The dependent variable is the relative price as defined in equation (2). The sector characteristics are obtained by aggregating firm level data with a weighted sum. Due to the aggregation to the sector level the number of observations that we have is relatively small.

[12] Differently from Schott (2007), our quantities data are in kilos and not in units. For example our unit value measures the average price of 10 kilos of cotton t-shirts instead of the price of one dozen.
[13] The overall evolution is shown in Figure 2.

Results in Table 4 is indeed suggestive of the fact that the widening price gap between Belgian and Chinese textiles products as illustrated in Figure 1, is indeed due to the entry of China into the club of WTO countries as indicated by the significance of the China entry dummy. Furthermore we find a positive relationship between the skill-intensity in Belgian Textiles and the widening price gap. As argued above, skill intensity in production often reflects quality and high-value added in production. This would indeed suggest that the relative rise in Belgian textiles prices reflect a shift towards higher value added products and better quality than the Chinese products. Apart from the skill-intensity none of the other firm-level variables seems to add further explanatory power in the regressions which is why we do not all show them here.

Table 4: Can **China's entry into WTO Explain the widening Price Gap between Belgian and Chinese Textiles?**

Eq. N°	**1**	**2**	**3**	**4**
China entry in WTO	.186 (.237)	3.51*** (.325)	3.52*** (.437)	3.61*** (.425)
Machinery/Employees (Capital Intensity)	1.59*** (.700)		.794 (.849)	.709 (.486)
Skilled/Unskilled		.137*** (.043)	1.43*** (.045)	.142*** (.045)
TFP Levinsohn Petrin				.567 (.474)
N° of obs	972	834	834	834
R^2	.25	.25	.25	.25
F-test	8.73	7.56	7.11	7.02

* Confidence interval of 90 percent, ** Confidence interval of 95 percent, *** Confidence Interval of 99 percent. Standard errors are robust. Each regression includes product level fixed effects, country and year dummies.

5. Conclusions

This paper aims to contribute to a better understanding of how industries in developed countries like Belgium respond to global competition forces notably competition from China. We focus on the Textile & Clothing industry for the reason that competition in this sector has

been amongst the fiercest. A country like Belgium traditionally has a substantial textiles industry. Moreover, Belgian firm level data contain information on skill content used in production. Our analysis involved two steps. In the first step we followed the work by Schott (2007) who for the US found a widening price gap between the US and Chinese price of textiles in the US market, which can be interpreted as an indication of quality upgrading in US textiles. Similarly in this paper we found that on the EU market, the unit values of Belgian exports of textiles have generally increased compared to similar Chinese. The widening price gap between Belgian and Chinese textiles is indicative of an upgrading process where Belgian textile firms upgrade their products. However, prices are only a proxy for quality and to exclude alternative interpretations, in a second step of our analysis we go in search of quality upgrading at the firm level. We do this by identifying Belgian textile firms in similar sectors as the Chinese textile exports to the EU and study the evolution of firm characteristics that have a bearing on product quality such as R&D spending, the skill mix and capital-intensity. From this first and tentative analysis, evidence suggests that Chinese competition has been significantly accompanied by a change in Belgian textile firms' production process. We find that as a result of China's entry into the WTO, the Belgian textile industry has shrunk over time with dis-investment in labour but not in capital. We provide evidence of higher capital intensity and a shift towards the use of more skilled labour in production after 2001. This evidence is in line with a story where EU Textiles is at the same time downsizing and switching into the production of more highly value added products. Theory would predict that Belgian textiles can only survive by producing textiles with a higher factor content than Chinese textiles. The firm-level evidence presented in this paper seems to suggest that indeed this is what is going on.

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Appendix

Textiles: 4 digit NACE classification

1710	Preparation and spinning of textile fibres
1720	Textile weaving
1740	Manufacture of made-up textile articles except apparels
1751	Manufacture of carpets and rugs
1752	Manufacture of cordage, rope twine and netting
1753	Manufacture of non-wovens and articles made from non-wovens, except apparel
1754	Manufacture of other textile n.e.c.
1760	Manufacture of knitted and crocheted articles
1771	Manufacture of knitted and crocheted hosiery
1772	Manufacture of knitted and crocheted pullovers cardigans And similar articles
1810	Manufacture of leather clothes
1821	Manufacture of wearing apparel, work-wear
1822	Manufacture of wearing apparel, other outerwear
1823	Manufacture of wearing apparel, underwear
1824	Manufacture of other wearing apparel and accessories n.e.c.
1830	Dressing and dyeing of fur; manufacture of articles of fur
1920	Manufacture of Luggage, handbags and the like saddlery and harness
1930	Manufacture of footwear